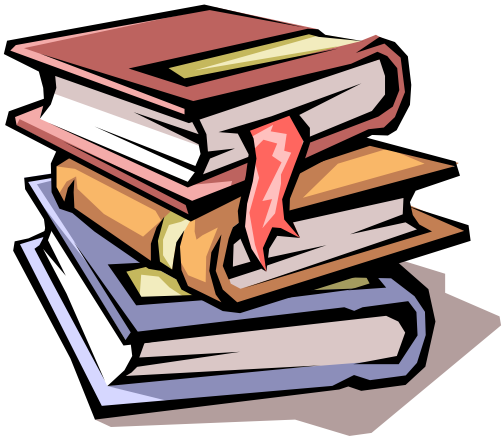
Melbourne High School Science

Year 9 Semester 2 2004



Worksheet Booklet

Name: ……..

Class: ……

Teacher: ……

All course information can be obtained from the Science web site:

http://resources.mhs.vic.edu.au/science/

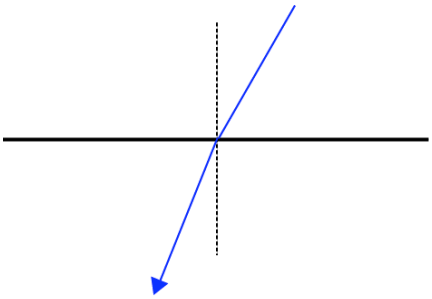
Printed: 7 June 2004

Colours of the rainbow

Glossary: Define the following terms

biconcave lens
converging lens
dispersion
focal length
polarisation
real image
reflection
refraction
total internal reflection
virtual image

Questions



1. The diagram on the right shows a ray of light leaving air and entering glass.

a) Copy this diagram and label the *normal*, *air/glass boundary, incident ray, refracted ray, angle of incidence* and *angle of refraction*.

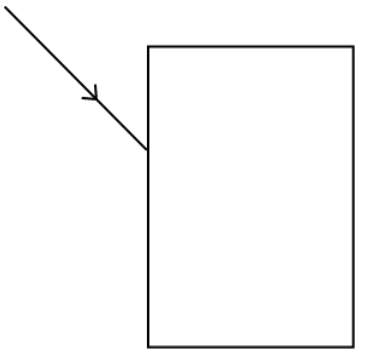
b) Has the refracted ray bent towards or away from the normal?

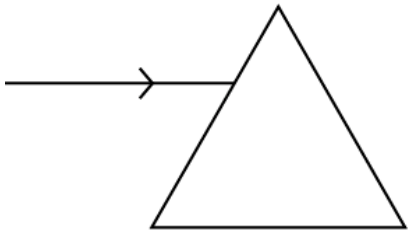
2. Total internal reflection can occur in specific situations.

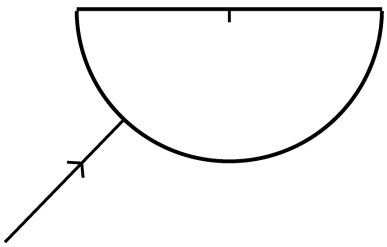
a) What happens in total internal reflection?

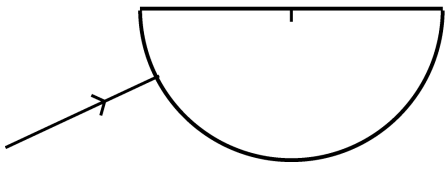
b) Use a diagram to explain your answer. List all of the factors necessary for this to occur

3. Copy the diagrams below and fill in where you think the rays would continue.



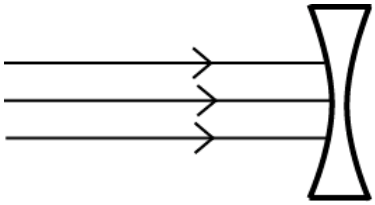


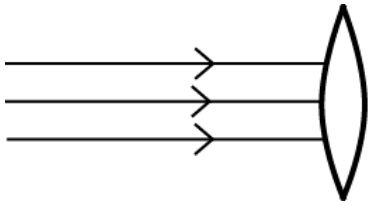




4. If light bends away from the normal as it passes from material 1 into material 2, then:
a) Draw a diagram to illustrate what is happening.
b) Which of the materials is more optically dense?
c) In which material does the light travel faster?
d) Suggest some possibilities for what materials 1 and 2 could be.

5. Copy the diagrams below and fill in where you think the rays would continue. Name the lens types shown.





6. Draw a diagram to show how you could locate the focal length of a concave lens.

7. Images can be described as real or virtual.
a) Name the type of lens that produces a real image.
b) How could you test if an image is real?
c) Must the object be close to or further away from the lens in order for this to occur? Explain.

8. List at least five devices that use lenses.

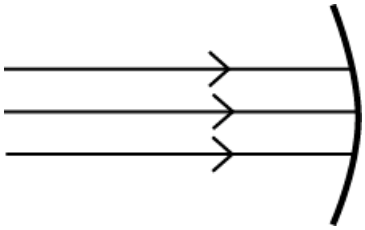
9. Which type of lens only produces smaller, upright images?

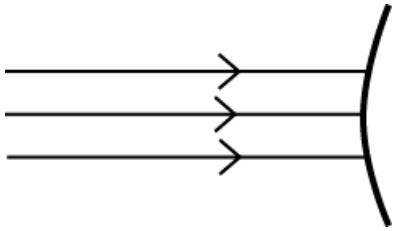
10. Would a simple camera use convex or concave lenses? Explain.

11. List the colours of the spectrum. If light of all these colours is shone together, what would it produce?

12. Explain the meaning of dispersion. Give an example of a situation where you may have noticed this effect.

13. Copy the diagrams below and fill in where you think the rays would continue. Name the mirror types shown.





14. Copy and complete the statements below about the adding of coloured lights.
a) red + blue → …….
b) red + green → …….
c) green + blue → …….
d) green + red + blue → …….

15. Copy and complete the statements below about the adding of coloured inks.

a) magenta + yellow → …….
b) magenta + cyan → …….
c) cyan + yellow → …….
d) cyan + magenta + yellow → …….
e) cyan + red → …….
f) red + green → …….

16. What colour would a green frog look under yellow light? Would any type of light make it appear black? Explain.

17. If red light passes through a magenta filter, what colour emerges?

18. If a green filter is placed behind the magenta filter, what will the result be?

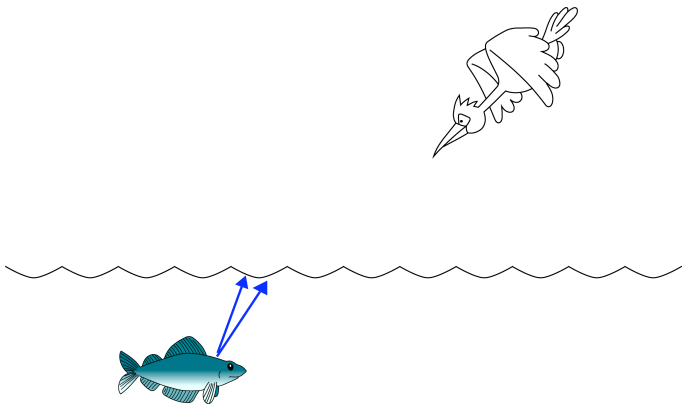
19. Gina and Clare decide to wear their new clothes to the night club. Gina looks stunning in her red top, blue pants and black shoes, and Clare is resplendent in her white top, yellow skirt and green shoes. The lighting inside the night club is nearly all red and blue. What would Gina's and Clare's clothes now look like?

20. Bill and Ben are relaxing on a beach. Bill is wearing red-tinted glasses and Ben is sporting a yellow pair. A toddler named Emily runs past them in a wobbly fashion, wearing a white T-shirt, green shorts and magenta cap. Describe how each will see Emily.

21. Describe the nature of a light wave.

22. If you were to look at a light source through two polarising lenses, with one held at 90° to the other, what would you see? Why?

23. A lucky seagull circling over the ocean spies a tasty morsel. Copy the diagram below and complete the path of the light rays to show how far below the surface the seagull's snack appears to lie, assuming that the surface is flat. Explain with the assistance of a diagram the effect that wave ripples on the surface would have on the way that the fish appears to the bird.



24. Pigments are chemicals that absorb some colours of light and reflect others. The colour of the reflected light determines the colour of the object containing the pigment. Pigment X reflects mostly orange light with a little red and yellow, but absorbs all green, blue, indigo and violet light. Pigment Y reflects mostly green light, with some blue and yellow, but absorbs all other colours. If you dye a pair of your favourite socks in a mixture of X and Y, what colour will they become?

25. A liquid crystal display uses polarisation and reflection. Explain how a digit is formed.

Structure & properties of matter

Glossary: Define the following terms

anion
cation
compound
ductile
electrical conductor
element
lattice
malleable
molecule
valence electron

Questions

1. Draw and complete this table. (The copy of the periodic table on pages 34–5 of your textbook will be useful here.)

Element	Number of electrons lost	Number of electrons gained	Number of electrons in the ion	Number of protons in the ion	Ion
potassium		_			K^+
fluorine	_	1			F^-
		2		8	
					Na^+
magnesium	2				
			18	17	
	2			20	
					Br^-

2. Choose the correct words from the box to complete the summary below.

elements	atom	valence	positive	noble	electrons	covalent	shared
attracted	metallic	lose					

Atoms sometimes gain or lose electrons to attain a stable electron arrangement like that of a _____ gas. Atoms that gain _____ have more electrons than protons and form ions with a negative charge. Atoms that lose electrons have more protons than electrons and form ions with a _____ charge. Positive and negative ions are _____ to each other and form ionic bonds. Ionic bonds tend to form between atoms of _____ and non-metallic elements.

Molecular substances form between atoms of non-metallic elements. They share valence electrons in _____ bonds. By sharing electrons, each _____ has the same number of electrons as a noble gas. The atoms share electrons but they do not gain or _____ electrons like ions do.

Metallic substances consist of positive ions in fixed positions called a lattice with _____ electrons that are free to move throughout the lattice. The electrons are not held by particular ions or _____ between particular atoms.

3. Magnesium burns in air to form magnesium oxide.
a) Would you expect this compound to be ionic or covalent? Explain.
b) Describe the physical properties you would expect this compound to have.
c) Draw a diagram showing the 3 dimensional arrangement of the particles in a crystal of magnesium oxide.
d) Will this compound conduct electricity in the solid state? Explain your answer.
e) Under what circumstances would you expect this compound to conduct electricity?

4. Write the chemical formula for each of the following substances:

a) calcium fluoride
b) silver nitrate
c) ammonium nitrate
d) iron (II) chlorate
e) calcium hydrogen carbonate
f) sodium carbonate
g) tin (IV) chloride
h) tin (IV) sulphate
i) aluminium nitrate
j) aluminium sulphate
k) potassium phosphate
l) barium phosphate
m) ammonium sulphate
n) zinc sulphite
o) chromium (III) oxide
p) aluminium carbonate

5. Write the names of the following compounds:

a) $(NH_4)SO_4$
b) K_2SO_4
c) $Mg(NO_3)_2$
d) CrF_3
e) $NaHCO_3$
f) $PbCl_2$
g) SnS_2
h) $Cu_3(PO_4)_2$
i) $Ba(HSO_4)_2$
j) NiI_2
k) HgO
l) $CaCO_3$
m) Al_2O_3
n) $FePO_4$
o) ZnS
p) ZnO

6. Draw a diagram showing the electrons and covalent bonds in the following molecules:
a) CO_2
b) H_2O
c) CH_4
d) NH_3

7. Salt water is a conductor of electricity while pure water is not.
a) Explain what is needed for a material to be a conductor of electricity.
b) What type of particles are conducting electricity in the salt solution?
c) Draw a diagram of the particles that exist in salt water.

Under Control

Glossary: Define the following terms

brainstem
cerebrum
dendrites
hormone
neurone
neurotransmitter
pancreas
pituitary gland
reflex
synapse

Questions

1. Outline the differences between *effectors* and *receptors*.

2. Name the two systems in the body that are responsible for transmitting messages. Which one is quicker?

3. What does *CNS* and *PNS* stand for?

4. List the different types of stimuli that humans can detect, and what sort of receptor is responsible for each stimulus.

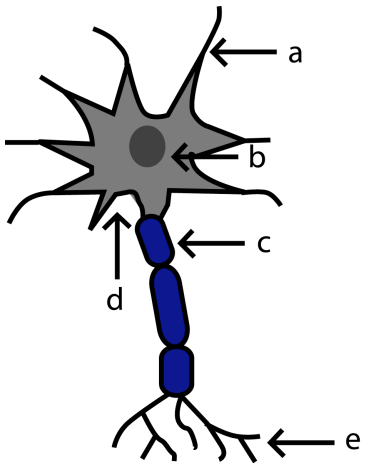
5. Can you think of any types of stimuli that humans **cannot** detect? Are there other animals that can?

6. How is a *reflex action* (such as pulling your hand away from a hot stove) different from a *conscious action* (like turning off the stove)? Explain.

7. The nervous system carries messages throughout the body in electrical and chemical form. Explain the link between the electrical and chemical components and where they occur.

8. It is essential that plants and animals have systems and mechanisms for regulation and control of body functions. Give one example of a hormone and its use by the body.

9. The following diagram shows a neurone, with five parts labelled. Match the five parts of a nerve cell to the positions in the diagram.



axon branches	
cell body	
nucleus	
myelin sheath	
dendrites	

10. What prevents hormonal response from continuing long after the hormone is released?

11. State two reasons why the body would use hormones rather than electrical impulses to send messages.

12. Listed below are several of the effects of adrenalin, released during stress. Explain how each plays a role in preparing the body for action in response to stress: increased heart rate, dilation of bronchioles, glucose released from liver, increased breathing rate.

13. Complete the crossword on the following page.

Across

1 The part that comprises 80% of the brain.

4 The hormone responsible for female characteristics.

5 The outer covering of nerve fibres. (two words)

7 The part of the nervous system that controls breathing, blood pressure and heart rate.

8 The creative and emotional side of the brain.

9 The part of the brain responsible for coordination and balance.

10 The outer protective covering of the eyeball.

13 The coloured part of the eye composed of muscle.

15 The jelly-like substance that fills the eye.

17 Thick bone protecting the brain.

18 The hormone that directs blood flow away from the digestive system to the brain and muscles.

Down

2 The pathway of a reflex action. (two words)

3 Receptors that are sensitive to mechanical stimulations such as touch.

5 Three thin membranes that cover and protect the brain.

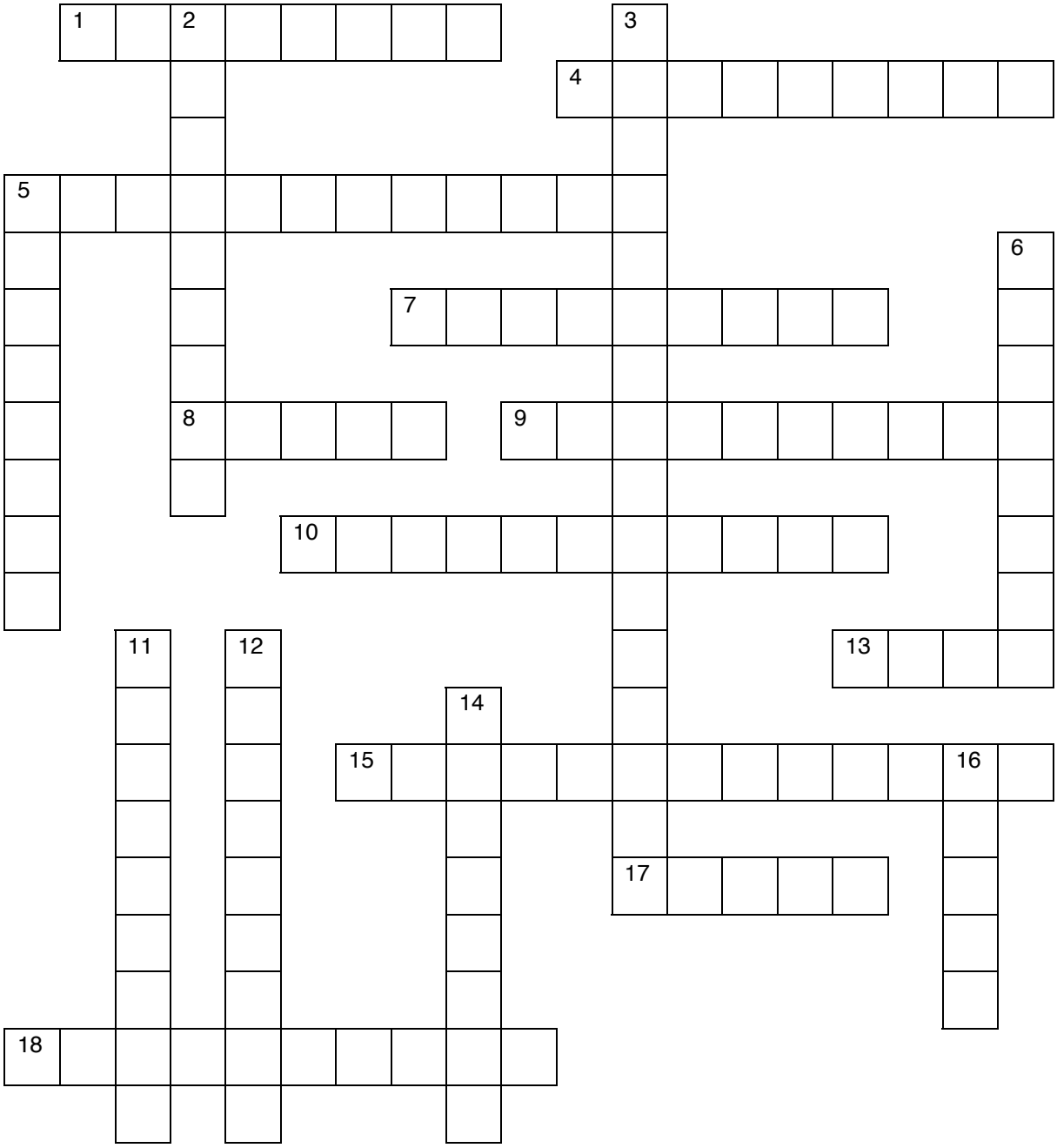
6 Chemical messengers of the body.

11 The gland that controls other endocrine glands.

12 The type of gland that produces hormones.

14 The gas that causes fruit to ripen.

16 The type of nerve that sends messages from photoreceptors to the brain.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